

## A LOW LOSS OPTICAL WAVEGUIDE, A METHOD OF ITS MANUFACTURE AND AN OPTICAL DEVICE

### ABSTRACT

The invention relates to an optical waveguide for guiding light in a predefined wavelength range, the optical waveguide comprising core and cladding regions for confining light, the core and/or cladding region or regions being formed on a substrate and comprising material of the stoichiometric composition  $\text{Si}_2\text{O}_x\text{N}_y\text{X}_z\text{H}$ . The invention further relates to a method of manufacturing an optical waveguide, an optical waveguide obtainable by the method and an optical device comprising such a waveguide. The object of the present invention is to provide an optical waveguide with low optical loss due to a reduced hydrogen bond-originated absorption. The problem is solved in that X is selected from the group of elements B, Al, P, S, As, Sb and combinations thereof, and the ratio  $y/z$  is larger than 1. This has the advantage that a low optical absorption in the waveguide may be achieved, possibly over a broad wavelength range. Further, a relatively low annealing temperature may be used yielding a relatively low induced strain whereby a low birefringence may be achieved. The optical waveguide may e.g. be manufactured by PECVD, which is ideal for the further processing of low loss waveguides. Waveguides according to the invention show superior transmission characterized with losses below 0.05 dB/cm between 900 nm and 1600 nm. In particular the absorption due to the second overtone of the Si:N-H vibration may be lowered to a value below the detection level. The invention may e.g. be used for the optical communications systems, in particular for branching components (e.g. splitters) and components for wavelength division multiplexing (WDM) systems, e.g. telecommunication systems, fibre-to-the-home, etc.

(FIG. 4 should be published)